

Abstract Submitted  
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**Quantification of factors contributing to the x-ray spot produced by the paraxial diode with a plasma-filled drift cell** DAVID SHORT, Atomic Weapons Establishment, DALE WELCH, Voss Scientific — The paraxial diode with a plasma-filled drift cell is currently under investigation as a focusing element for the HRF at AWE Aldermaston. The long term x-radiographic goal is for an x-ray dose of 1000 Rads@1m in a 2mm spot. To meet this the plasma-filled drift cell needs to provide complete space charge and current neutralization. In this manner the electrons will focus ballistically meeting at a common focus within the plasma drift cell [1]. However, any time variation in current neutralization, due to a finite magnetic diffusivity, will result in some degree of focal sweep and an increased spot size at the high Z target. The work presented here will attempt to quantify this factor and any other effects that impact the spot on the high Z target. Computer simulations are carried using the particle in cell code Lsp [2]. An idealized beam injection into the drift cell was used to examine the effect perfect entrance conditions would have on the focusing spot. The findings indicate that the plasma-filled paraxial using a flat plate cathode is likely to give a total time integrated spot of around 3mm. Updates on the latest simulations are also discussed. [1]. D.Welch *et al.* Transport of a relativistic electron beam in gas and plasma-filled focusing cells for x-radiography, *Phys.Plasmas*, **11**, pp 751-760 (2004) [2]. Lsp is a software product of Mission Research Corporation, [www.mrcabq.com](http://www.mrcabq.com)

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